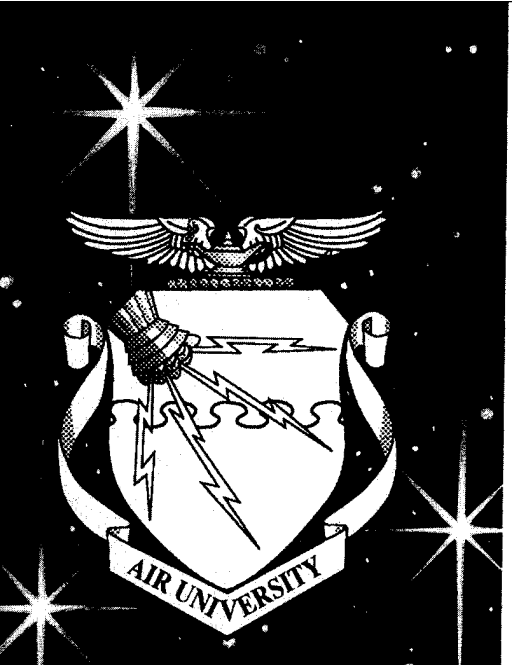

AIR UNIVERSITY

Enhancement of the Civil Reserve Air Fleet

An Alternative for Bridging the Airlift Gap

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School of Advanced Airpower Studies

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Abstract

United States military airlift policy strives to maximize the available wartime reserve of airlift for a given investment. Unfortunately, the capacity of America's strategic airlift system has consistently fallen short of the proposed wartime requirements and remains so today. During the 1970s and 1980s, the Military Airlift Command's (MAC) attempts to reduce the airlift deficit included a Civil Reserve Air Fleet (CRAF) Enhancement Program that subsidized the conversion of CRAF jumbo aircraft into cargo-convertibles. Although several aircraft were modified, the program was allowed to die during the 1980s. However, this option needs to be reexamined since Air Mobility Command's (AMC) efforts to close the contemporary airlift gap—such as C-17 procurement, the C-141 Service Life Extension Program, and the outright purchase and operation of a fleet of commercial cargo aircraft—are expensive and problem-ridden.

This study determines if a revival of the CRAF Enhancement Program is feasible and if it could be developed into a viable program for addressing AMC's airlift shortfall problem. To achieve this goal, the study analyzes the failure of the first CRAF Enhancement Program to determine if the barriers to its success were surmountable and if these same barriers might impede the success of a future program. The study determines that the first enhancement program failed because MAC was unable to develop an incentive plan that was attractive enough to ensure airline participation, yet be persuasive enough to elicit the required support and funding from Congress.

The contemporary environment is also examined to determine if there exist new concerns, or barriers, that could impair implementation of a future CRAF Enhancement Program. The study finds that the contemporary environment is almost completely opposite to that which existed during the first enhancement program. Whereas today's AMC stands a good chance of gaining congressional support for a cost-effective incentive plan, drastic changes to the airline environment will likely increase the actual incentive the airlines will expect for participation, particularly in relation to the original enhancement program. Changes to the character of the commercial airline fleet—such as reductions to the domestic wide-body fleet, increased foreign carrier competition, and the shift toward leasing and international agreements—and airline concerns over future CRAF activations have created new constraints that could limit the cost-effectiveness of a new CRAF Enhancement Program.

This study finds that implementation of a small enhancement program—targeted at domestic wide-body or medium-sized aircraft—or a program whereby the government leases enhanced aircraft to the airlines might be advantageous and several implementation recommendations are presented. In the end, this study concludes that, although contemporary conditions do not favor the implementation of a large-scale traditional CRAF Enhancement Program, AMC could benefit by implementing a small-scale or modified CRAF enhancement plan that was tailored to the current situation.

About the Author

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Chapter 1

Introduction

I have directed prompt action to increase our airlift capacity. Obtaining additional airlift mobility—and obtaining it now—will better assure the ability of our conventional forces to respond with discrimination and speed to any problem spot on the globe at any moment's notice. In particular it will enable us to meet any deliberate effort to avoid or divert our forces by starting limited wars in widely scattered parts of the globe.

—President John F. Kennedy

One might believe that this statement represents the "current" Department of Defense (DOD) guidance concerning the critical importance of strategic airlift in relation to America's recent reductions in its military force structure; however, the statement, made over 34 years ago by President John F. Kennedy in his 30 January 1961 State of the Union message, describes a condition that has afflicted the strategic airlift domain almost continuously since its earliest days—*the need to increase the capacity of America's strategic airlift system*. Just as President Kennedy found that the cold war security environment, combined with his newfound strategy of "flexible response," necessitated an increased strategic airlift capability, today's Air Mobility Command (AMC) also finds that the not-so-peaceful post-cold-war climate, coupled with force reductions, curtailed forward presence; and reduced host-nation support sustains a need for more strategic airlift capacity than the nation has thus far been able to provide. Thus, as it was before President Kennedy's address, the United States confronts an "airlift gap"—one likely to broaden as elements of the current airlift fleet reach the end of their useful life.[1]

Although the Air Force has recognized the current airlift shortfall problem, its efforts to implement a workable solution have been problem-ridden. AMC had counted on the technologically advanced C-17 to bridge the airlift gap; however, cost overruns, technological setbacks, program management problems, and production delays have resulted in severe program curtailments. Reductions in the C-17 buy from the original goal of 210 airframes to the current plan for only 40 have left America's airlift system several million ton-miles-per-day (MTM/D)[2] short of its required lift capability. Additionally, the C-141 retirement program, that is currently underway, threatens to increase this airlift gap by an additional 10.4 MTM/D over the next 10 years.[3]

AMC has contemplated several possible solutions to the widening airlift gap; however, absent from the list of alternatives is a unique strategic airlift augmentation program called Civil Reserve Air Fleet (CRAF) Enhancement. The Military Airlift Command (MAC) initiated the CRAF Enhancement Program in the 1970s to reduce the airlift deficit by adding an on-call cargo capability to commercial jumbo passenger aircraft, permitting their use as either a passenger or a cargo-carrying platform. This original CRAF Enhancement Program resulted in the successful modification of several aircraft; however, the program atrophied during the 1980s. This option needs to be reexamined today since AMC's current alternatives designed to address the airlift shortfall—such as the procurement of additional C-17s, the C-141 Service Life Extension Program, and the outright purchase of a fleet of commercial cargo aircraft—are expensive and problem-ridden. A scrutiny of the original CRAF Enhancement Program's failure, as well as an analysis of the contemporary environment, is required to determine if the barriers to the success of a future CRAF Enhancement Program are surmountable. Therefore, the purpose of this study is to determine if a revival of the CRAF Enhancement Program is feasible and if it could be developed into a viable program for addressing AMC's increasing airlift shortfall problem.

To accomplish this task, this study will first examine the environment in which the CRAF Enhancement Program is designed to operate and the nature of the airlift shortfall it intends to fill. The succeeding analysis of the CRAF enhancement concept and its previous implementation will identify the original barriers to the program's success and will determine if similar barriers would prevent the successful execution of a new CRAF Enhancement Program. Additionally, this study examines the contemporary environment to ascertain the existence of current barriers and analyzes their potential effects. This study concludes with implications to consider when contemplating the viability of any future CRAF Enhancement Program and provides recommendations that could improve the program's chance for success.

Notes

1. This study is not intended to confirm or verify the existence or size of America's airlift shortfall. Therefore, the study makes the assumption that the shortfall figures provided by Air Mobility Command and in the Mobility Requirements Study Bottom Up Review are valid.

2. Million ton-miles-per-day (MTM/D) is a common term used to describe a quantity of strategic cargo-airlift capacity. The actual equation to calculate the MTM/D for one aircraft is

$$\frac{\text{(utilization rate)} \times \text{(blockspeed)} \times \text{(payload)} \times \text{(productivity factor)}}{\text{1,000,000 nautical miles.}}$$

For additional information, see AMC, "1995 Air Mobility Master Plan," 1995, 1–22.

3. Capt Timothy S. Smith, strategic airlift plans officer, Headquarters AMC, Long Range Plans, worksheet, subject: Strategic Capability, 12 April 1995. Note: Worksheet figures are for planning purposes only.

Chapter 2

The National Airlift System

Prior to examining the CRAF enhancement concept for future potential, it is essential to first understand the collection of resources that America uses to create its strategic air mobility—the National Airlift System. This chapter describes the purpose of this system and examines the national policy that guides its existence. The chapter concludes with an examination of the character and causes of the current strategic airlift shortfall and provides a description of the alternatives AMC has considered in its effort to solve this problem.

The Purpose of the National Airlift System

The overriding purpose of the National Airlift System is described in President Ronald Reagan's 1987 National Airlift Policy statement:

> The national defense airlift objective is to ensure that military and civilian airlift resources will be able to meet defense mobilization and deployment requirements in support of U.S. defense and foreign policies.[1]

Although our airlift objective appears to be relatively clear, it leaves many questions unanswered—for example, "Should the National Airlift System prepare primarily for peacetime or wartime operations?" or "Should the National Airlift System be organized for peak efficiency or maximum effectiveness?" The 1987 National Airlift Policy attempts to maximize all of these variables by stating that the airlift system should be developed "*efficiently and effectively* to meet established requirements for airlift in both *peacetime* and in the event of *crisis* or *war*" (emphasis added).[2] This policy guidance can become quite confusing in terms of force structure planning, because the most *effective* wartime airlift force could quite possibly prove *inefficient* in peacetime and, possibly, even in times of war.

During 1987, when the National Airlift Policy statement was disseminated, the tension between wartime and peacetime requirements was of minimal importance, since the cold war environment stressed the wartime role of the airlift system. The MAC deputy chief of staff for plans reinforced this perception in his interpretation of the newly approved policy statement: "In addition, the new statement retains the keystone of our initial submission—that the peacetime force of MAC and the mobilization base of the commercial air carrier industry must reflect wartime needs."[3]

Today, however, the tension between peace and war is more important. The post-cold-war environment provides America with increased opportunities and demands to utilize airlift in situations short of war. For this reason, the focus of AMC, US Transportation Command (USTRANSCOM), and Air Staff planning is shifting away from an almost exclusive emphasis on wartime.

The issue of the civilian and military roles in the airlift system creates another policy concern. On several occasions since the end of World War II, proponents of the civil and military components of the airlift system have locked horns over who should move military passengers and cargo in times of peace. Military proponents claim that peacetime movement of cargo and passengers on organic military transports is a cost-effective by-product of the need to train and exercise the military's wartime airlift system.[4] Commercial proponents claim that this practice constituted unfair competition and that the airlines could, in fact, carry most military cargo and passengers more efficiently than the military.[5] Current airlift policy attempts to reduce this tension by stating:

> During peacetime, Department of Defense regulations for passenger and/or cargo airlift augmentation shall be satisfied by the procurement of airlift from commercial air carriers participating in the Civil Reserve Air Fleet Program, to the extent that the Department of Defense determines that such airlift is suitable and responsive to the military requirement.[6]

Given these tensions over wartime and peacetime requirements and component roles, current airlift policy aims to develop a compromise airlift system, fine-tuned neither for peace nor war operations but capable of conducting both. In this paradigm, some inefficiency is accepted in order to gain flexibility (e.g., the unique capabilities provided by the organic military fleet justify the high costs these assets entail). Indeed, one contemporary airlift thinker argues that the overriding focus of current airlift policy is "not to build an airlift fleet that can meet a specific requirement but to acquire the largest and most generally capable airlift with the funds available."[7] Since fiscal realities make it unlikely that AMC could acquire sufficient airlift resources to meet the enormous "desires" of war planners, the ultimate goal is to organize the components of the National Airlift System to provide the greatest possible reserve of wartime airlift capacity, yet, at the same time, maintain an efficient and effective airlift force that can fulfill DOD's peacetime airlift requirements.

Components of the National Airlift System

The National Airlift System consists of *military* and *civilian* components. These components not only include the aircraft and crews, the success of the airlift system also depends on the proper management and operation of a variety of support assets—such as aerial ports; logistics and maintenance organizations; command, control, communications, and computer systems; and

the people who make it all work.[8] Since a detailed examination of these additional portions of the airlift system is beyond the scope of this study, this chapter will concentrate on the aircraft and crews that move the passengers and cargo.

Civilian Airlift

The large number of civilian aircraft operated by US civil air carriers represents a great source of airlift potential, both in peace and during war. The National Airlift System has two methods of tapping this airlift reservoir: (1) the Civil Reserve Air Fleet and (2) civilian contract airlift.

The Civil Reserve Air Fleet. The government and airline industry combined to establish the CRAF Program in 1952 to provide a system for augmenting military airlift with commercial aircraft in an emergency situation.[9] Under this program, US civil air carriers voluntarily enter into a contractual agreement requiring them to contribute some of their passenger and/or cargo aircraft in the event the military component is unable to fulfill the airlift requirements of a contingency or wartime situation. In exchange for this commitment, CRAF participants receive priority access to a large portion of DOD's peacetime passenger and cargo airlift business.[10] This concept, thus, creates a large amount of potential airlift capability, and the only cost to the government is the compensation provided to the carriers as they carry out routine DOD contract airlift business. The airlift capability generated by the CRAF does not require the government to purchase, man, and maintain any aircraft during peacetime.[11]

Based on the extent of augmentation required, activation of the CRAF can be accomplished in three stages—with Stage I presently providing access to 80 long-range international aircraft, Stage II providing 238 aircraft, and Stage III providing full mobilization of all 379 aircraft currently in the CRAF fleet.[12] All three stages can be activated by the commander in chief, US Transportation Command, with approval of the secretary of defense. Activation of Stages I and II requires CRAF response within 24 hours of mission assignment, whereas Stage III response time is 48 hours.[13] Overall, the CRAF provides the National Airlift System with a great ability to augment the military airlift component in time of need, as it proved during Operations Desert Shield and Desert Storm when 27 percent of the airlift cargo, 62 percent of the passengers in the deployment phase, and 84 percent of the passengers in the redeployment phase were moved by commercial airlift.[14]

Civilian Contract Airlift. Keeping in line with the requirements of National Airlift Policy, most of the DOD's passenger traffic and a significant portion of its cargo airlift requirements are fulfilled by civil air carriers through contract operations. According to the AMC CRAF contracting office, an average of 30 percent of DOD's peacetime cargo requirements and 90 percent of its passenger requirements is airlifted by the civilian carriers.[15]

In order to be eligible to bid for DOD's contract airlift, a civil carrier must be a member of the CRAF and meet the minimum CRAF participation

requirements.[16] The allocation of the contract airlift is accomplished through a mathematical apportionment process. This process divides the contracts among the civil carriers based upon the amount and type of airlift each carrier makes available to the CRAF.[17]

Military Airlift

The military component of the National Airlift System employs aircraft and crews from the active duty Air Force, the US Air Force Reserve, and the Air National Guard.[18] The unique assets of the military component provide national leaders with airlift capabilities that cannot be obtained from civil airlift assets. Military airlift assets have several desirable characteristics:

- Not all DOD cargo will fit in civilian aircraft. Few CRAF aircraft will carry oversized cargo and none will carry outsized cargo.[19] Military airlift is necessary to permit the movement of this type of cargo.
- Civil air carriers will not always be willing or able to lift passengers and/or cargo to the desired locations. Operations into hostile areas and to some "less prepared" airfields will likely remain the domain of military airlift.
- Military airlift provides a greater ability to conduct secret operations.
- Military airlift provides the unique ability to conduct airborne operations.
- On short-notice, time-critical missions, military planners can easily reprogram en route military aircraft or launch standby military crews, often permitting a quicker response that could be obtained through the use of civil aircraft. Contract commercial airlift could maintain a similar capability with aircraft on "alert" status that could respond on short notice; however, the unpredictable nature of these missions makes it questionable that civil airlift could fulfill all the mission requirements (e.g., outsized cargo, flights into hostile areas).

In order to create these unique capabilities, the military airlift component operates four types of strategic airlift aircraft—the C-5, C-141, C-17, and KC-10. All except the KC-10 were designed to conduct the unique missions that civil carriers were either unable or unwilling to carry out. These missions—called hard-core military or military unique—include airdrop, austere field operations, refueled flights, and special operations. Operations into hostile areas often require airlift aircraft with special capabilities. The first three aircraft, consequently, come with military-specific design features, such as a T-tail to facilitate loading and airdrop; large cargo doors and ramps to accommodate over and outsized cargo; and high wings and unique landing gear configurations to permit operations at austere fields and improve ground maneuvering.[20] Although these features make it possible for the C-5, C-141, and C-17 to conduct their unique missions, they cannot move passengers (and smaller cargo) as efficiently as can civilian aircraft. Therefore, it is uncommon to find these design characteristics on aircraft operating in the profit-driven civil aviation environment. AMC's other strategic airlifter, the KC-10, was purchased primarily for use in refueling operations, but it does possess a

significant cargo capability. AMC currently plans to operate 37 of these modified DC-10s in a cargo-hauling capacity during wartime.[21]

Although the National Airlift System has been described as two distinct entities—the military and civilian airlift components—it is the synergistic interaction of these two ingredients that underpins the system's great potential for strategic mobility in both peace and war. Whereas the somewhat inefficient military component represents an ability to conduct hard-core military airlift operations, the civilian component provides cost-effective nonhard-core airlift in peace, saving the government money and simultaneously exercising the CRAF for war.

The Airlift Shortfall

> *The United States has built an air mobility fleet second to none. However, we are in danger of losing the capability this fleet provides. The combination of an extremely high operations tempo, aging equipment, and scarce resources poses a major threat to the nation's air mobility system and, hence, our ability to project power abroad.*
>
> —Gen Robert L. Rutherford, commander
> Air Mobility Command

The unique speed, responsiveness, and flexibility of our National Airlift System have made it an indispensable pillar of the strategic mobility triad. Unfortunately, the strategic lift capability of America's airlift system has never been sufficient to meet the nation's lift requirements.[22] AMC seems to be stuck in an airlift Ping-Pong match in which a mobility study sets a minimum airlift requirement . . . which airlift forces are unable to achieve . . . which requires a reevaluation of the military strategy . . . which results in a new lower requirement . . . which airlift is unable to achieve . . . and so on. Although the capacity of the National Airlift System has been increased, the nation's airlift requirements have been reduced on several occasions—including the cut to the 66 MTM/D goal proscribed by the 1981 Congressionally Mandated Mobility Study and to the current Mobility Requirement Study Bottom Up Review's goal of 52 MTM/D.[23]

Even with the recent reduction of the airlift requirement to 52 MTM/D, the National Airlift System is still 3.2 MTM/D short of its new strategic airlift goal.[24] Although this puts the airlift system close to reaching its goal, the interaction of the following conditions will, if not compensated for, result in an average yearly *decrease* in the nation's strategic airlift capability through the year 2000.[25]

- C-141 Retirements: Up until the last year or two, AMC planners hoped to retain the C-141 fleet until the 2010–2015 time frame. Unfortunately, this option proved to be too expensive and has resulted in an earlier-than-planned C-141 retirement schedule. All active duty C-141s are now scheduled for retirement by 2003, and the reserve C-141s will retire by 2006. This will result in the loss of almost 11 MTM/D worth of strategic airlift capability during the next 11 years.[26]

- C-17 Acquisitions: Reductions in the planned C-17 buy and production delays have resulted in slower-than-planned addition of the much-needed C-17 airlift capability.[27]

The unfortunate combination of the earlier-than-planned C-141 retirement and the drawn out C-17 acquisition schedule has created a situation where during the next five years the additional airlift capability created by each year's C-17 acquisitions will be, on the average, insufficient to offset the losses generated by that year's C-141 retirements (see table 1).

Table 1

Projected Strategic Airlift Gains/Losses through 2000 (in MTM/D)

Year	C-141	C-17	Yearly Total
1996	-0.64	+0.66	+0.02
1997	-1.29	+0.26	-1.03
1998	-1.27	+0.53	-0.74
1999	-0.45	+1.05	+0.60
2000	-2.04	+1.05	+0.99
TOTAL	-5.69	+3.55	**-2.14**

Source: Strategic Capability worksheet, 12 April 1995, Headquarters AMC/XPDI.

Even if the C-17 buy is increased to the hoped-for 120 aircraft level, C-17 production will remain unable to compensate for the accelerated losses of C-141s. Additionally, even if AMC could reach the point where all 120 C-17s were finally operational, there would still exist a cargo airlift shortfall of over 2.5 MTM/D. Unless action is taken to compensate for these conditions, the airlift gap could grow to greater than 10 percent of the total airlift requirement by the year 2000. AMC has been examining alternatives that could help solve this problem.

Air Mobility Command Attempts to Fill the Gap

AMC planners have considered and rejected several possible solutions to the expanding airlift gap. These candidate solutions included a C-141 service life extension program (SLEP), acquisition of additional C-5Bs, and a "wait and see" approach to see if increased acquisition of the C-17 would be approved.[28] The C-141 SLEP was rejected due to its high cost and the threat of major unforeseen problems and expenses. The C-5B option was discarded because of its high life-cycle costs and immense ramp space requirements that ultimately limit how much cargo can be delivered into a single location. Finally, there is no promise that additional C-17s will be authorized; and even if the most optimistic increase was granted, the short-term airlift shortfall would continue to expand.

At this time, AMC plans to bridge the airlift gap with the so-called non-developmental airlift aircraft (NDAA) program. The NDAA concept involves purchasing "off-the-shelf" technology in the form of a currently existing airframe that is capable of carrying, or has been modified to carry, cargo.[29]

With guidance from the 1994 Defense Authorization Act, requiring the creation of a plan to complement the C-17, AMC developed the NDAA Program which includes two distinct "airlifter" requirements: (1) a nondevelopmental commercial cargo wide-body airlifter (C-XX) capable of transporting bulk and oversize cargo and (2) a nondevelopmental military wide-body airlifter (C-XY) with oversize, outsize, and airdrop capability.[30]

The specific requirements for the NDAA include the following.[31]

- C-XX and C-XY
  - Federal Aviation Administration (FAA) certified or military equivalent
  - Transoceanic capability
  - Military compatible communications/navigation
  - Meets FAA Stage III noise standards
  - 463L pallet and materials handling equipment compatible
- C-XX (Commercial)
  - Bulk and oversize capability
  - Operates into a mature infrastructure
  - Potential candidates: B-747-200 (used), B-747-400 (new), DC-10 (used), and MD-11 (new)
- C-XY (Military)
  - Bulk, oversized, and military-unique capabilities (airdrop, roll on, roll off)
  - Operates into a less than mature infrastructure
  - Potential candidate: Lockheed C-5D

The composition of the NDAA fleet (both quantity and C-XX/C-XY mix) is not yet established. This determination will be based on the results of the fall 1995 Defense Acquisition Board (DAB) and on the findings of the Strategic Airlift Force Mix Analysis currently underway at Headquarters AMC.[32] This delay is required because the desired NDAA fleet composition is highly dependent on the final number of C-17s AMC is allowed to procure.[33] If AMC receives enough C-17s to fulfill its outsize cargo and military-unique requirements, the C-XX will be purchased in sufficient quantity to fill the remaining bulk and oversize cargo shortfall. However, if the C-17 buy is insufficient to meet the outsize and military-unique requirements, the purchase of both the C-XX and C-XY will be required to compensate for both the civilian-compatible and military-unique airlift deficiencies.[34]

In March 1995, a request for proposal (RFP) for the NDAA aircraft was distributed. The RFP defined "break points" that established various NDAA airlift requirements based upon eight different levels of C-17 procurement.[35] The advantage of this process is that, once the level of C-17 procurement is established, the NDAA acquisition process will proceed rapidly, utilizing the source that was previously selected as best for that particular C-17 break point.

Proponents of the NDAA alternative claim it has several advantages. First, the use of off-the-shelf technology should reduce acquisition time, thereby, allowing a timely solution to the airlift shortfall problem. Second, the use of a "current" and proven aircraft design (with appropriate modifications) is less expensive than designing a new airlifter or refurbishing an old one (e.g., the C-141).[36] Finally, the break-point process and the ability to alter the C-XX/C-XY mix permit the flexibility required to compensate for the uncertainty surrounding the C-17 acquisition issue.

Conversely, the NDAA alternative is not without its disadvantages. First, the ability of the NDAA to "get on board" quickly and produce airlift ton-miles may not be as great as is suggested. There are indications that it will be the year 2000 before the first NDAA comes on-line.[37] In that case, the ability of the NDAA to act as a gap-filler to offset the increasing shortfall that will be created by the C-141/C-17 problem could be minimal. By the time the benefits of the NDAA would be felt, the annual gains from C-17 acquisition would already be exceeding the C-141 losses. Second, even though the concept of purchasing a nondevelopmental aircraft provides cost savings over designing and building a totally new airlifter, the great costs of developing the necessary, and currently nonexistent, maintenance and logistic system, ground handling infrastructure, and aircrew organization must be considered. Finally, the concept of the military operating a "commercial" airlifter (C-XX) to haul CRAF compatible cargo, into and out of locations with mature infrastructures, is likely to revive the dispute over the proper roles of the civil and military airlift components that plagued military airlift policy during the 1950s and 1960s. A resumption of this legal conflict could delay implementation of the NDAA Program for several years and possibly result in cancellation of the C-XX portion.

The NDAA Program, if it can be implemented in a timely manner and can avoid the sticky civil/military legal issues, offers the potential to create a short-to-medium term solution to the National Airlift System's shortfall problem. It is curious, though, that AMC has concentrated only on the outright purchase and operation of the NDAA and has overlooked—it appears—the possible benefits of creating similar additional airlift capability through the implementation of the Civil Reserve Air Fleet Enhancement Program.[38] The following chapter provides a detailed description of the theoretical and practical aspects of the CRAF enhancement concept.

Notes

1. National Security Decision Directive (NSDD) 280, *National Airlift Policy*, 24 June 1987, 1.
2. Ibid.
3. Maj Gen Richard J. Trzaskoma, Staff Summary Sheet, Report on National Airlift Policy Statement, 30 July 1987.
4. Theodore J. Crackle, "History of the Civil Reserve Air Fleet" (PhD diss., Center for Air Force History, 1993), 206–7. See also Lt Col Robert C. Owen, "A Structural and Operational Future for Global Airlift," *Comparative Strategy* 12, no. 4 (October–December 1993): 461.

5. Owen, 461.

6. NSDD 280, 2.

7. Lt Col Robert C. Owen, "The Airlift System: A Primer," *Airpower Journal* 9, no. 3 (Fall 1995): 21.

8. Maj Christopher A. Kelly, "The Airlift System—It's More Than Just Hauling Trash," Research Report no. 86-1360 (Maxwell AFB, Ala.: Air Command and Staff College, 1986), 4–8.

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14. AMC, *1995 Air Mobility Master Plan*, 1995, 4–21, hereafter cited as 1995 *Master Plan*.

15. Sandy Halama, airlift contracting officer, Headquarters AMC, telephone interview with author, 23 May 1995.

16. To join the CRAF, a carrier must (1) offer aircraft suitable for CRAF operations; (2) provide sufficient resources for each aircraft (e.g., flight and ground crews, support personnel, and support facilities); (3) comply with FAA regulations; (4) ensure availability of committed aircraft; (5) ensure the proper number of trained crews, with appropriate security clearances, are provided; and (6) agree to a minimum response time once notified of activation. See Mary Chenoweth, *The Civil Reserve Air Fleet: An Example of the Use of Commercial Assets to Expand Military Capabilities During Contingencies*, RAND Note N-2838-AF (Santa Monica, Calif.: RAND, June 1990), 6–7.

17. Lt Col Nelson R. Wilt, deputy assistant for Civil Air Office, Headquarters AMC, interview with author, 12 May 1995.

18. *US Air Force Airlift Master Plan*, 29 September 1983, II-2.

19. *1995 Master Plan*, 1-4, 1-5. The plan provides the following definitions regarding cargo type and size: (1) **bulk cargo** consists of general cargo that is typically preloaded on pallets and transportable by common cargo aircraft; (2) **oversize cargo** is cargo that requires a C-130 or larger aircraft to transport; and (3) **outsize cargo** is transportable normally only by C-5 or C-17.

20. Owen, "Future for Global Airlift," 462.

21. Capt Timothy S. Smith, strategic airlift plans officer, Headquarters AMC, Long Range Plans, worksheet, subject: Strategic Capability, 12 April 1995. Note: Worksheet figures are for planning purposes only.

22. Jeffrey Record, *U.S. Strategic Airlift: Requirements and Capabilities* (Washington, D.C.: Corporate Press Inc., 1985), 1.

23. Col Robert P. Mims, "Airlift," briefing, Air War College, Maxwell AFB, Ala., May 1995. See also Owen, "Future for Global Airlift," 467.

24. Capt Timothy S. Smith, strategic airlift plans officer, Headquarters AMC, Long Range Plans, interview with author, 12 May 1995.

25. Smith, Strategic Capability, worksheet.

26. Ibid.

27. Capt Timothy S. Smith, telephone interview with author, 23 May 1995.

28. It is the author's opinion that AMC has not yet given up the ghost on this option. Discussions with personnel at Headquarters AMC and USTRANSCOM indicate there is much anticipation of getting more C-17s following the fall 1995 defense acquisition board.

29. *1995 Master Plan*, NDAA road map sheet.

30. Ibid. See also Mims, slide 57.

31. Mims, slides 57–59.

32. *1995 Master Plan*, 4–32. The purpose of the AMC Strategic Airlift Force Mix Analysis is to evaluate the cost and operational effectiveness of various aircraft mixes and provide the members of the fall 1995 defense acquisition board with the insight and information they need

to make an educated acquisition decision. The board's decision will determine the size of the C-17 buy and the type and number of NDAA to procure in order to supplement the C-17.

33. Ibid.

34. Smith interview, 12 May 1995.

35. Efforts to match aircraft types and quantities to specific "break points" are not yet complete and are expected to remain classified until after the fall 1995 defense acquisition board. Air Force Materiel Command, NDAA request for proposal, ID no. F33657-95-R-0002, 12 April 1995, 126.

36. Owen, "Future for Global Airlift," 463.

37. Smith, Strategic Capability, worksheet.

38. The author was unable to find evidence that the CRAF Enhancement Program was considered as an alternative.

Chapter 3

Civil Reserve Air Fleet Enhancement: Theory and Reality

The next step to determine the future potential of enhancing the Civil Reserve Air Fleet is to examine the enhancement concept closely—both in theory and in actual practice. This chapter juxtaposes the theoretical underpinnings of the CRAF enhancement concept with the technical, economic, and bureaucratic realities that accompanied the enhancement program that was implemented during the 1970s and 1980s. Throughout these two decades, numerous studies confirmed the CRAF Enhancement Program's potential to "give the Air Force more outsize capability for the money than any other alternative examined";[1] however, the program fell well short of its original goals and eventually decayed to its current, almost dormant, status. The CRAF Enhancement Program failed, not because of insurmountable technological problems, but because of MAC's inability to develop an incentive program that was strong enough to overcome the anxieties of the airlines and promote participation in the program, while at the same time, obtain the legislative support and financial backing of Congress.

Establishing the Program

The CRAF enhancement concept (or CRAF modification as it was initially known) was an outgrowth of MAC's October 1973 Emergency Cargo Airlift Capabilities Study, which made the following three cargo airlift-increasing recommendations: (1) continue the C-5 wing modification program; (2) stretch the C-141 to accommodate additional cargo; and (3) improve the cargo capabilities of the Civil Reserve Air Fleet.[2] The intent of the CRAF Enhancement Program was to provide a cost-effective means of increasing the capacity of the National Airlift System.

The Enhancement Concept

The theoretical foundations of the CRAF Enhancement Program are very similar to those of the CRAF Program itself. As previously discussed, the basic Civil Reserve Air Fleet Program is utilized to create a large wartime reserve of passenger and cargo airlift capacity. This airlift capacity becomes

available to the DOD when civil carriers obligate a portion of their passenger and/or cargo fleet to the CRAF Program. Although the capacity of the civil passenger aircraft fleet greatly exceeds DOD's passenger airlift requirements, the amount of pure cargo airlift capability that the civil carriers are willing or able to include in the CRAF may not be sufficient to cover the military's cargo airlift shortfall.[3]

The goal of the CRAF enhancement concept is to *create* and ensure access to *additional* CRAF cargo airlift capability that could be used to alleviate shortfalls in military airlift capability. CRAF enhancement attempts to achieve this goal by encouraging the civil air carriers to modify a portion of their existing, or future, passenger aircraft fleet so that when conditions dictate, the passenger features can be removed and the aircraft would be capable of carrying the required cargo.[4] (Note: The ability to convert from a passenger configuration to a cargo configuration is often described as being *cargo-convertible*).

To demonstrate this concept graphically, notice that in table 2 there are two areas of civil airlift capability—passenger only and cargo only. Without CRAF enhancement, AMC's access to commercial cargo airlift augmentation is limited not only by the amount of cargo-only assets that are available (the shaded area) but also by the amount of cargo-only aircraft that have been enrolled in the CRAF Program (the striped area).[5] Should the military airlift component require CRAF cargo airlift augmentation in excess of the "striped" CRAF cargo area's capability, a shortfall will occur.

Table 2

Available Commercial Passenger and Cargo Fleet

CRAF Passenger Only	Passenger Only	CRAF Cargo	Cargo Only

What CRAF enhancement attempts to do is to enlarge the striped section by moving its left border further into the passenger-only area (see table 3). As long as the CRAF passenger-only capacity is sufficient to satisfy the DOD passenger requirements, the excess passenger-only (non-CRAF) capability is of little value to AMC in its present form. CRAF enhancement, however, increases the value of this excess by transforming the passenger-only aircraft into cargo-convertibles. By creating a latent cargo capability in the enhanced cargo-convertibles, increased cargo airlift augmentation is now available to AMC. Additionally, unlike in the cargo-only area, CRAF enhancement contractual obligations would make 100 percent of the cargo-convertible area available for airlift augmentation.

Table 3

CRAF Enhanced Commercial Passenger and Cargo Fleet

CRAF Passenger Only	Passenger Only	Enhanced CRAF Cargo	CRAF Cargo	Cargo Only

The actual mechanics of physically creating a cargo-convertible out of a passenger aircraft vary depending on the type of aircraft being converted. However, the modification process would most likely include (1) the addition of a large side cargo door and/or a nose visor to facilitate the on loading and off-loading of cargo; (2) strengthening of the floor to allow it to support oversized and heavy cargo; (3) the possible addition of a cargo-roller system to facilitate the handling and securing of cargo; and (4) additional equipment to ensure interoperability when functioning in the military airlift system (e.g., transponders, navigation equipment, secure communications systems).[6] After these modifications were completed, the aircraft would be reconfigured for passenger operations, yet, would retain the potential for rapid conversion to its cargo-hauling configuration when necessary.[7]

Incentives Are Key

Although the CRAF enhancement concept, in theory, appears to be a cost-effective means to create additional cargo airlift capacity and the modification process seems to be straightforward, the whole program depends on the ability to persuade the commercial air carriers to participate and agree to have their aircraft modified into cargo-convertibles. Since the civil carriers are profit-driven organizations and since the cargo-convertibility modifications—due to the addition of weight—actually decrease the day-to-day operating efficiency of the aircraft, it is apparent that some form of incentive must be offered to the civil carrier to entice participation. Therefore, for an incentive to be successful, it must not only address the initial costs of the modification but also the increased costs of operating the heavier-than-normal "enhanced" aircraft (e.g., higher fuel usage and increased maintenance costs).

In addition to reimbursing the participating carriers for the modification and increased operating expenses, there must be some additional incentive (e.g., some minimal acceptable level of profit) in order to convince the carriers that the modifications are a good business risk. Since participation in the CRAF Enhancement Program is voluntary, the ability of MAC to develop an incentive program that is acceptable to the civil carriers *and* is supported with funding from Congress is essential to the success of the program.

Advantages and Disadvantages

Similar to any of the previous alternatives proposed to bridge the airlift gap, the CRAF enhancement concept has its good points, as well as some

less-than-desirable points. The following list describes many of the "anticipated" advantages of the CRAF enhancement concept:

- The creation, maintenance, and operation of CRAF enhancement cargo capability will cost less than a similar amount of organic capability. According to Air Force estimates, the costs of converting one B-747 into a CRAF enhancement cargo-convertible would amount to approximately one-sixth of the cost of owning and operating it for the same period.[8] Additionally, a civil-type aircraft can usually carry loads for a lower cost than a military transport. This is possible because the military transport's unique mission requirements (e.g., short/austere field operations, airdrop, the ability to survive in hostile environments, roll-on/roll-off capability) mandate the incorporation of features that ultimately reduce the aircraft's efficiency.[9]
- Similar to the NDAA alternative's claim, CRAF enhancement could offer a rapid means of combating the increasing airlift shortfall since the concept requires no major design or development phases. The quickest modifications could be conducted on relatively new existing aircraft or on new orders currently in production.
- CRAF enhancement offers a method to create supplemental cargo airlift capability without the requirement for civil carriers to purchase additional aircraft. The economics of the commercial air carrier industry do not always support fleet enlargement; therefore, the ability to modify existing passenger aircraft may be the only means to increase the cargo airlift potential of the civilian fleet.
- CRAF enhancement helps reduce the risk of gutting the civilian cargo industry should CRAF activation become necessary. Tapping into the larger civil passenger fleet for its latent cargo potential should result in reduced disruptions in the civil cargo airlift business in the event of a large CRAF cargo call-up.
- The 1987 National Airlift Policy Statement provides guidance concerning the incorporation of military features into new aircraft; however, the Air Force is reluctant to pursue this avenue because of strong civil carrier resistance. The CRAF Enhancement Program offers an alternative that avoids this confrontational issue.[10]

The advantages of the CRAF enhancement concept make it an attractive option; however, the concept is not without its flaws. The following list describes some of the possible disadvantages of the concept:

- Although CRAF enhancement would generate additional bulk and oversize cargo airlift capability, it would not increase our ability to move outsized cargo or conduct hard-core military missions.[11]
- When compared to organic military airlift assets, the CRAF enhancement capability would be less flexible and responsive to military taskings. Military assets do not require CRAF activation or voluntary cooperation to get the mission done.

- There may be difficulties in persuading the civil carriers to participate in the CRAF enhancement concept. Since the concept attempts to create additional, yet latent, cargo airlift capability that may not be commercially necessary, the civil air carriers will find little economic benefit in participating. In fact, the costs of conversion, along with increased operating costs due to increased weight and maintenance requirements, make the enhancement modifications unattractive if not accompanied by some form of compensation or incentive program.

Although not all-inclusive, the previous lists have described the major advantages and disadvantages of the CRAF enhancement concept. In addition to the pros and cons that have just been discussed, actual implementation of the CRAF Enhancement Program would result in the generation of several new issues that would have to be addressed. The first of these issues is the determination of what type of aircraft should be eligible for modification. The individual characteristics of each aircraft design (e.g., speed, range, ability to be modified with a large enough cargo door) make the modification of some types of aircraft more feasible and attractive than others. Standards would have to be established to ensure that only suitable aircraft are actually modified.

Closely related to the previous issue, CRAF enhancement program managers would have to make a determination of how old an aircraft they would be willing to convert. As much as AMC would like to modify only new-purchase aircraft in their production phase, a lack of new aircraft orders may preclude this. Although AMC may be forced to consider converting other-than-new airframes, it should set a maximum aircraft age limit for conversion eligibility. This is required because the conversion of older aircraft is accompanied by some, or all, of the following disadvantages: (1) older aircraft may not be equipped with all the efficiency or effectiveness promoting modifications that newer versions of the same design have embodied; (2) older aircraft will generally have a shorter remaining service life; and (3) the cost of converting any in-service aircraft will most likely be higher because of the requirement to compensate the civil carriers for any loss of revenue incurred while the aircraft is being modified.

The third issue concerns how AMC will entice the civil air carriers to participate in the enhancement program. There are many options available ranging from promises of increased contract business to complete reimbursements for modification, including increased yearly operating expenses so as to produce a profit for the airlines. AMC will have to walk a fine line keeping the program's expenses under control while simultaneously providing sufficient incentives to induce the air carriers to participate.

The fourth issue revolves around the policy regarding the air carrier's use of any enhanced aircraft's cargo capability. Although the CRAF enhancement concept envisions that the cargo-convertibles would normally be operated in their passenger configuration, some civil air carriers may desire to exploit the aircraft's cargo capability. Administrators of a CRAF Enhancement Program may find it advantageous to permit some carriers to use this capability,

especially as an incentive for participation; however, this raises additional issues, such as the following: *Will the government pay for all the modification costs? Will this be viewed as unfair competition by other civil cargo carriers?* and *What should the government charge the carriers for the ability to exploit the cargo airlift potential of these aircraft?* These issues must be addressed in order to determine the conditions under which the carrier can use the aircraft in its cargo mode to carry non-DOD airlift business.

The fifth issue requires a determination of how long an enhanced aircraft is obligated to CRAF service and under what conditions the air carrier is required to make it available for service.

The final issue concerns the military's access to a carrier's enhanced aircraft in the event it would be leased or sold to another carrier. Additionally, questions pertaining to what will happen if a CRAF-enhanced carrier goes out of business must be answered.

The successful implementation of any CRAF Enhancement Program will depend, in a large part, on the ability of DOD, AMC, and the civil air carriers to resolve these issues. Inability to settle these issues would likely result in either a degradation of the carriers' desire to participate and/or a reduction in the ultimate cost-effectiveness of the program.

The CRAF enhancement concept, in its pure theoretical form, has the potential to create a cost-effective, timely increase in our nation's cargo airlift capability without the requirement for the military or the civilian airlift fleet to be increased in its overall size. Similar to most other airlift increasing alternatives, enhancement of the CRAF has several distinct advantages and disadvantages that must be considered when measuring the program's ultimate potential. Finally, implementation of a CRAF Enhancement Program would result in the creation of numerous issues that, although apparently straightforward in this theoretical "rational world" context, could threaten to produce complications when addressed in the "real world." These real-world complications will be examined in detail in the following description of the actual implementation of the first CRAF Enhancement Program.

How It Actually Worked—The Civil Reserve Air Fleet Enhancement Program

The CRAF Enhancement Program was originally developed in the early 1970s to provide a cost-effective means of increasing the cargo airlift capacity of the National Airlift System. At this time, military planners were predicting that the size of the forces needed to reinforce NATO would increase while the time available to deploy these forces would decrease, thus placing more emphasis on strategic airlift.[12] To fill these latest requirements, mobility planners realized that the capacity of the National Airlift System must increase. And, since the combined cargo airlift potential of the military and civil airlift components already exceeded the peacetime requirements but fell

well short of the wartime requirements, the relatively low projected costs of the CRAF Enhancement Program made it an attractive alternative.

The first formal request for participation in the CRAF Enhancement Program, or request for proposal, was distributed on 16 December 1974. The RFP queried 19 US civil air carriers as to the types and numbers of wide-body passenger aircraft they were willing to make available for enhancement modifications.[13] The RFP described an incentive program that was based on providing an increased percentage of MAC's peacetime airlift business to the carriers that acquired cargo-convertible aircraft. This "profit" incentive would be in addition to the military's requirement to pay for the modification costs. Based upon the manner in which the carrier planned to utilize the modified aircraft, MAC proposed the two following modification options.[14]

- If the modified aircraft would not be used in civil cargo service during its first year of operation, the government would pay for all modification costs. In the event the aircraft was used for civil cargo operation following the first year, the carrier would be required to refund a preestablished portion of the modification expenses.
- If the modified aircraft was intended for civil cargo service, the government would pay for 50 percent of the modification costs. Additionally, if the carrier decided to sell the modified aircraft within eight years of delivery, the carrier would reimburse the government according to a set schedule.

Airline interest generally remained strong throughout the program. When the dust settled, response to the first RFP was very good with the civil carriers offering 81 aircraft for modification. Although this was 29 aircraft short of MAC's 110 aircraft goal, the program appeared promising.

In the period between December 1974 and July 1985, MAC distributed six different RFPs for the CRAF Enhancement Program. Although each RFP was met with varying degrees of enthusiasm, there existed, on the average, sufficient civil air carrier interest that could have potentially been converted into a significant improvement in the nation's cargo airlift capability. Unfortunately, the potential benefits that might have accompanied this encouraging level of interest were not to be achieved. Even though MAC had created an incentive plan that generated significant civil air carrier interest in the program, it would be 1977 before Congress authorized *any* funds for the CRAF Enhancement Program, and the $7.5 million they provided that year was insufficient to modify even one aircraft.[15]

During the ensuing years of the CRAF Enhancement Program, MAC found itself with the unenviable goal of attempting to develop an enhancement plan that was attractive enough to generate civil air carrier interest while simultaneously garnering the required funding from Congress that it needed to follow through on the interest it had created. With the exception of a single modified United DC-10, MAC would be unable to achieve this goal until, when in 1983, it succeeded in signing a contract and procuring partial funding for

the conversion of one Pan American World Airways Boeing 747-200, with options to modify an additional 18 aircraft.[16]

By 1984, ten years of CRAF enhancement efforts had created an additional cargo airlift capacity of only 0.11 MTM/D.[17] It became obvious to MAC that there existed significant barriers to the success of the CRAF Enhancement Program.

Barriers to Success

The barriers to the CRAF Enhancement Program's success consisted of the concerns of two key groups over the viability of the program—the *civil air carriers* and the *government*. The principal concerns of the civil air carriers centered on the economic and risk aspects of the program, whereas the government's concerns focused on the program's justification, its cost-effectiveness, and the availability and security of any airlift potential created by the program.

Civil Air Carrier Concerns

The initial responses the civil air carriers made to the 1974 CRAF enhancement RFP were, for the most part, extremely positive; however, as time passed and more of the details and issues surrounding the enhancement program came to light, the civil carriers discovered reasons to reduce their willingness to participate. The civil carriers' concerns appeared to fall into two major groups: (1) concerns over the profitability of the program and (2) concerns over the government's commitment to provide long-term support of the program.

First and foremost, the profit-oriented civil carriers had to satisfy themselves that the decision to modify some of their aircraft was a profitable one. Although the airlines had several profit-driven concerns over the CRAF Enhancement Program, this chapter will describe the three most significant concerns.

First, the carriers understood that the government would pay for the costs associated with modifying the aircraft; however, there appeared to be confusion over the issue of reimbursing the airlines for the increased operating costs that accompanied the modification of the aircraft. The added weight of the modifications would increase the consumption of fuel and also create some additional maintenance expenses. Although the December 1974 RFP requested that the carriers estimate these increased operating expenses, it provided no hint of how reimbursement, if any, would be handled. Eventually, MAC developed a "lump sum" solution that promised to make a onetime payment to cover the total estimated increases in operating expenses over the life of the contract.[18]

The second, profit-driven concern centered on the fact that the fuel price and supply volatility of the 1970s made the lump-sum solution a risky adventure for the air carriers.[19] The carriers were worried that unexpected

increases in fuel costs or decreases in fuel availability would not be compensated for under the lump-sum plan. In this case, a carrier that operated the more fuel-inefficient cargo-convertibles stood to, at best, lose money, and at worse, be unable to procure enough fuel to fly the convertibles. This concern was so strong that, when MAC was unable to create a suitable solution, Braniff International Airways terminated negotiations with MAC for the first enhancement contract that was actually funded.[20]

The third "profit based" air carrier concern involved the *bonus award plan,* which was intended to provide the profit portion of the CRAF enhancement incentive plan. All of the costs previously discussed were only intended to reimburse the civil air carriers for the expenses involved in modifying and operating a cargo-convertible. MAC needed a "carrot" to dangle in front of the carriers to entice them into participating. MAC's carrot originally consisted of the bonus award plan. By inflating the mobilization point value of cargo-convertible aircraft, the bonus award plan redistributed DOD's contract airlift business in the favor of carriers who operated the convertibles.[21]

The second major component of civil air carrier concern pertained to the government's level of commitment to the program. Through the early 1970s, the civil carriers usually responded favorably to the numerous RFPs and surveys MAC conducted. The carriers had analyzed the risks, negotiated compromise solutions, and appeared ready to commit to contracts. However, Congress repeatedly failed to provide the funding required to turn the enhancement program into a reality. In fact, it would be fiscal year 1978 before any CRAF enhancement funds would be allocated, and even those—a mere $7.5 million—were insufficient to fund even 50 percent of a single aircraft modification.[22] The civil air carriers "were hesitant to make a large commitment to the program without assurances that the government would fully support it."[23] These concerns over questionable government support were reinforced as the government consistently failed to provide the funding needed to pursue the program; on numerous occasions changed the rules concerning the bonus award program, thus changing the potential profitability of participation; and issued and reissued RFPs without acting on the positive responses. The airlines were very concerned about getting involved in a long-term 16-year-CRAF enhancement contract and subsequently concerned of being left in an unprofitable situation should the government decide to withdraw funding or change the rules of the program. Members of the MAC staff informed Headquarters USAF that "the airlines would cooperate once the government made a long-term commitment to the program"; and that once this occurred, "the projected purchase orders would make enough planes available for the program."[24]

The Government's Concerns

The security environment of the 1970s made it clear to Congress that additional strategic airlift capability was necessary. During the November 1975 House Committee on Armed Services' hearings on the future of airlift,

the committee was quite enthusiastic over the enhancement program and recommended that "we push forward with the crisis conversion [CRAF enhancement] as the near term, most cost-effective way to gain airlift enhancement."[25] Unfortunately, this enthusiasm did not generate the funding the CRAF Enhancement Program needed to become a reality. Congress already had several concerns over the viability of the CRAF Enhancement Program and was unwilling to provide funds until these concerns were adequately answered.

Congress's first concern was that it did not completely understand the concept of the CRAF Enhancement Program. In response to another year's failure to acquire any funding for the enhancement program, the secretary of defense, in 1976, attributed "the failure of CRAF to pass congressional scrutiny to the DOD's failure to properly explain the need for the CRAF modification, even though it was the most cost-effective of all the airlift enhancement options."[26] Until Congress developed a clear understanding of the program's advantages and disadvantages, it was not willing to provide funding.

Congress was also concerned that the CRAF Enhancement Program was just a subsidy for the airlines. Sen Barry Goldwater claimed that the Senate Armed Services Committee had disapproved CRAF funding in 1974 because "they felt that the proposed modification to commercial aircraft was more of a blessing to the airlines than to the DOD."[27] Under mounting pressure for the deregulation of the civil airline industry, Congress was sensitive to the perception of increased governmental involvement in supporting, or subsidizing, the civil air carriers.

Another congressional barrier for the advancement of CRAF enhancement was Congress's and the Air Force's inaccurate perception that an incentive program utilizing the bonus award of additional DOD airlift contracts to CRAF enhancement participants would provide sufficient profit incentives to the civil air carriers.[28] By 1972, MAC had spent more than a decade attempting to use peacetime airlift contract incentives in an effort to enhance the cargo airlift capacity of the CRAF. These efforts were unsuccessful—demonstrated by the fact that between 1970 and 1973 there was actually a 12 percent decrease in the number of cargo-capable aircraft in the CRAF Program.[29] In order to motivate the civil air carriers to participate, MAC would first have to recognize and correct this inaccurate perception.

The final major barrier to congressional support concerned the government's rights and liabilities in the event a CRAF-enhanced aircraft was sold, leased, or damaged, as well as the disposition of any modified aircraft should its parent carrier become financially troubled. Congress was concerned that the US government might be held liable if it were determined that an accident involving a CRAF enhanced aircraft was caused by the modifications.[30] Additionally, Congress was worried that government access to the modified aircraft could be jeopardized if the carrier decided to sell or lease the aircraft, or that the public's investment might be totally lost if the carrier was to file bankruptcy.[31]

At various times throughout the duration of the CRAF Enhancement Program, the unanswered concerns of the airlines and/or the government developed into barriers to the program's successful implementation. In order to achieve the program's goals, MAC would have to overcome these barriers by satisfying these concerns.

MAC Attempts to Overcome the Barriers

By 1974, with the completion of the Emergency Cargo Airlift Capabilities Study, MAC had chosen the CRAF enhancement concept as a major portion of its plan for increasing the cargo airlift capacity of the National Airlift System. This section will examine MAC's efforts to overcome the concerns of both the civil air carriers and Congress in order to develop a CRAF enhancement plan that could succeed.

Addressing the Concerns of the Airlines

MAC addressed the concerns of the civil carriers directly and with generally good success. Concerning the commercial profitability of the CRAF Enhancement Program, MAC quickly realized that the promise of increased peacetime DOD airlift contracts in exchange for participation was not a suitable incentive. Initial airline complaints about the "bonus award plan" led the MAC DCS (deputy chief of staff) of Plans to state that the dollars redistributed by this plan "may be too few to motivate" and that the answer to the incentive problem resided outside the procurement award structure.[32] Gen Paul K. Carlton, commander in chief of MAC (CINCMAC) concurred, warning that "continued support of the old cargo incentive theory could blunt or kill the whole airlift enhancement program which MAC had developed."[33]

MAC attempted to rectify the situation by recommending additional incentives above and beyond the actual costs of modification. These included government guarantee of loans to assist "credit risk" carriers in the purchase of convertible aircraft, low interest loans, depreciation and tax incentives, and assistance in procuring insurance.[34] MAC even succeeded in getting authorization to offer pure cash incentives for participation. It was able to offer $50,000 per year for each converted aircraft as a supplement to the 1974 RFP and, in 1980, MAC even offered Braniff a $500,000-cash incentive to convert one aircraft.[35]

In a similar matter, MAC was able to mitigate the concerns of the civil air carriers over the issue of the lump-sum payment for increased operating costs. Although MAC was unable to get Congress to act in time to salvage the Braniff contract negotiations, Congress did finally grant approval for MAC to include a fuel price adjustment clause in future RFPs and contracts.[36] The generally high level of positive civil air carrier responses to the various RFPs indicates that MAC was generally able to develop an incentive plan that satisfied the profit concerns of the airlines.

Even though MAC eventually addressed the civil air carriers' concerns over profitability and fuel cost increases, the command was never able to eliminate their concern that the government was not totally committed to the program. The unwillingness of Congress to fund the program was interpreted by the airlines as a lack of faith and commitment to the CRAF Enhancement Program. MAC continued to fight for funding, but it took until 1979 before Congress allocated enough money for the first conversion.[37]

Addressing the Concerns of the Government

MAC's efforts to provide answers for the government's concerns did not achieve as much success as they had with the airlines. Although MAC hurdled several barriers, it was never able to persuade Congress to provide full support to the enhancement program.

In answer to the concerns of Sen Patrick J. Leahy, acting chairman, US Senate Research and Development Committee, about the availability and liability issues involved with the sales, lease, or damage to enhanced aircraft, MAC's DCS/Plans responded that DOD would accrue no responsibility for accidents because "the modified aircraft would be certified by both FAA [Federal Aviation Administration] and the contractor in a manner similar to certification/acceptance of modified civil aircraft already operating."[38] Although MAC did not guarantee the access to the modified aircraft in the event of its sale or lease, it did provide for repayment of the government's investment—through a memorandum of agreement—should the aircraft be sold or leased to a nonparticipating carrier.[39]

MAC, however, did not take sufficient action to answer the congressional concern over the status of the modified aircraft in the event a carrier should encounter financial difficulty. This failure would come back to haunt MAC when, in January 1991, Pan American (Pan Am) Airlines declared bankruptcy.[40] Unfortunately, government recourse in this situation was very limited. MAC's contract with Pan Am included the right to make cash claims against the unamortized portion of the modification expenses; but, it did not give the government any claim to the enhanced aircraft.[41] With Pan Am owning 18 of the 23 CRAF enhanced aircraft, the future availability of these assets and the viability of the program were put in jeopardy.

MAC's inability to provide Congress with clear justification for the program's existence resulted in a seven-year delay in the allocation of start-up funding. This delay had multiple negative effects.

- It delayed the recognition of other barriers (such as the fuel-cost reimbursement problem) that only became visible during contract negotiations. This resulted in additional delays that ultimately pushed the program into the financially turbulent deregulatory period.
- It caused the program to miss several opportunities where contracts could have been established with the carriers for modification of more attractive "new production" aircraft. In 1978, knowing that Congress had to act quickly in order to take advantage of several new wide-body

aircraft orders, Secretary of Defense Harold Brown petitioned the Senate Armed Services Committee for support and quick action. Unfortunately, once again, the funds provided were insufficient.[42]

- Finally, congressional inaction only reinforced the airlines' perceptions, and subsequent concerns, that the US government did not fully support the program.

MAC's failure to impress on Congress that the estimated costs for conversion were based upon modifying several aircraft at a time also hindered the program's progress. Airlift planners expected that spreading out the nonrecurring modification expenses across a greater number of aircraft would result in lower per-unit costs. Once it became apparent that Congress provided funding sufficient to modify only one or two aircraft, Boeing Company required that all nonrecurring costs be included in its estimate for converting the first CRAF enhancement aircraft, which amounted to a price tag of $20–23 million.[43] If Congress had properly understood the mechanics of the CRAF Enhancement Program, it would have realized that the $15 million it had allocated to the program would be too little to conduct a single modification.

Finally, MAC was able to achieve a small degree of success in convincing Congress that the CRAF Enhancement Program was not just another form of airline subsidy. This is demonstrated in the fact that MAC was allowed to offer "cash" incentives in exchange for participation and was eventually granted some flexibility in developing an agreeable reimbursement plan for unanticipated fuel expenses. It is apparent, though, that MAC was never fully able to convince Congress that the CRAF Enhancement Program was not only the most cost-effective method for increasing the country's cargo airlift capacity but that it was also affordable and worth supporting.

Summary

The CRAF Enhancement Program began in the early 1970s with the goal of modifying 110 wide-body aircraft into airlift enhancing cargo-convertibles. Although Congress and the civil air carriers appeared to initially support the program and its goals, it would take almost a decade to produce the first cargo-convertible and an additional seven years to create the current total of only 23 enhanced aircraft.[44]

This apparently cost-effective and initially well-received program ran into several barriers that blocked its path to success. MAC was able to overcome some of these obstacles (airline profitability concerns; fuel reimbursements; and details concerning the sale, lease, or damage of enhanced aircraft), but it failed to overcome two related barriers that ultimately resulted in the failure of the CRAF Enhancement Program. First, MAC was unable to make Congress understand the viability of the program. The effect of this failure

was that funding was continuously reduced, deleted, or delayed—resulting in numerous missed opportunities and, in the end, funding that was insufficient to achieve the program's goals. The second unconquerable barrier was related directly to the first. The civil air carriers had observed the government's continued reluctance to support the program and, as time progressed, began to realize that the incentives MAC could offer might not be sufficient to offset the risks.

In summary, it was the combination of these two critical barriers that prevented MAC from being able to develop an incentive plan that was attractive enough to ensure airline participation, yet be persuasive enough to elicit the required support and funding from Congress. The questions remain: "Was the program's failure unavoidable?" and "What is the future potential, if any, of the CRAF enhancement concept?"

Notes

1. MAC History, 1 January–31 December 1979, vol. 1, 406.
2. Assistant DCS/Plans, Headquarters MAC, "Summary of Study Actions: MAC Emergency Cargo Airlift Capabilities Study II," 5 November 1973. Supporting document VI-115 in MAC History, 1 July 1973–30 June 1974.
3. The aircraft that civil carriers order and operate usually fall into either a pure-passenger capability (no provision for "all cargo" transport) or pure-cargo capability (no provision for "all passenger" transport). It should be noted that today's passenger aircraft—especially wide-body aircraft—usually have a limited lower deck cargo capability. This is of very limited value for "cargo" airlift operations.
4. *Military Airlift: Changes Underway to Ensure Continued Success of Civil Reserve Air Fleet*, GAO/NSIAD-93-12 (Washington, D.C.: General Accounting Office, December 1992), 2. Note: Conversion time from passenger configuration to cargo configuration was established as 24 hours.
5. For a variety of reasons, a CRAF participating civil carrier will often include less than 100 percent of its fleet in the CRAF Program. Additionally, several carriers have chosen not to participate in the CRAF program, thereby, reducing the amount of cargo airlift augmentation available to AMC to a level that is less than 100 percent of the total commercial fleet's cargo-only capability.
6. MAC History, 1 January–31 December 1985, vol. 1, 434.
7. Ibid.
8. Mary Chenoweth, *The Civil Reserve Air Fleet: An Example of the Use of Commercial Assets to Expand Military Capabilities During Contingencies*, RAND Note 2838-AF (Santa Monica, Calif.: RAND, June 1990), 22.
9. Jean R. Gebman, Lois J. Batchelder, and Katherine M. Poehlmann, *Finding the Right Mix of Military and Civil Airlift: Issues and Implications*, RAND MR-406/AF, 3 vols. (Santa Monica, Calif.: RAND, 1994), 1: 2.
10. Chenoweth, 21.
11. A case could be made that the additional CRAF-enhanced capability would make available some outsize and military-unique mission-capable aircraft that would otherwise have been flown on bulk or oversized missions.
12. *US Air Force Airlift Master Plan*, 29 September 1983, III-2.
13. MAC History, 1 July 1974–31 December 1975, vol. 1, 339.
14. Ibid., 340.
15. Information compiled from CRAF and CRAF enhancement sections of the 1974–1977 histories of MAC.

16. MAC History, 1 January–31 December 1983, vol. 1, 480.

17. MAC History, 1 January–31 December 1982, vol. 1, 398.

18. DCS/Plans, Headquarters MAC, background paper, subject: Strategic Airlift Enhancement Initiatives, 24 May 1974. Supporting document VI-136 in MAC History, 1 July 1973–30 June 1974.

19. MAC History, 1 January–31 December 1979, vol. 1, 404.

20. Ibid.

21. MAC History, 1 July 1972–30 June 1973, vol. 1, 222.

22. MAC History, 1 January–31 December 1979, vol. 1, 403.

23. Ibid., 404.

24. Ibid., 405.

25. Research and Development Committee of the Committee on Armed Services, House of Representatives, report, *The Posture of Military Airlift*, 94th Cong., 2d sess., 9 April 1976, as cited in MAC History, 1 January–31 December 1976, vol. 1, 192.

26. MAC History, 1 July 1974–31 December 1975, vol. 1, 351.

27. Ibid., 345.

28. DCS/Plans, Headquarters AMC, Directorate of Studies and Analysis, CRAF Incentives, study, May 1972, 54–55.

29. MAC History, 1 July 1972–30 June 1973, vol. 1, 222.

30. MAC History, 1 January–31 December 1976, vol. 1, 197.

31. Ibid.

32. DCS/Plans, Headquarters MAC, briefing, subject: Airlift Policy Related to Cargo Set-Aside Proposals, 5 June 1973, slide 16. Supporting document III-1 in MAC History, 1 July 1972–30 June 1973.

33. Gen Paul K. Carlton, commander, MAC, to Stuart G. Tipton, senior vice president, Federal Affairs, Pan American World Airways, letter, subject: CRAF Modifications, 14 January 1975. Supporting document VI-110 in MAC History, 1 July 1974–31 December 1975.

34. DCS/Plans, Headquarters MAC, talking paper, subject: Legislation and Incentives Program, 12 May 1975. Supporting document VI-128 in MAC History, 1 July 1974–31 December 1975.

35. MAC History, 1 July 1974–31 December 1975, 341. See also MAC History, 1 January–31 December 1980, vol. 1, 448.

36. MAC History, 1 January–31 December 1979, vol. 1, 408.

37. Ibid.

38. DCS/Plans, Headquarters MAC, report, subject: MAC's Position on Senator Leahy's Report on Strategic Mobility, 13 May 1976, 17. Supporting document III-10 to MAC History, 1 January–31 December 1976.

39. Ibid.

40. *Military Airlift*, 19.

41. Department of Defense, Office of the Inspector General, *Civil Reserve Air Fleet*, Audit Report no. 92-068, 3 April 1992, 15–16.

42. Secretary of Defense to Hon John C. Stennis, chairman, Senate Armed Services Committee, letter, subject: CRAF Modification Legislation, 9 June 1978. Supporting document III-152 in MAC History, 1 January–31 December 1978.

43. MAC History, 1 January–31 December 1979, vol. 1, 403.

44. *Military Airlift*, 19.

Chapter 4

The Future of Civil Reserve Air Fleet Enhancement

On the eve of the Persian Gulf War, MAC's efforts to implement the CRAF Enhancement Program had spanned more than 18 years; however, as a result of these efforts, it had converted only 23 aircraft into cargo-convertibles. Within the next year, 96 percent of MAC's investment was put in jeopardy when Pan American Airlines filed for bankruptcy. This action sealed the fate of the already dying program.[1]

In an effort to determine if resurrection of the CRAF Enhancement Program could be a viable option for solving today's airlift shortfall problem, this chapter determines if the barriers that resulted in the failure of the first program were surmountable. It examines the contemporary environment to determine if any additional barriers to CRAF enhancement exist and examines their potential impact on the viability of any new CRAF Enhancement Program. The chapter concludes with implications and recommendations for any future use of the CRAF enhancement concept.

Was Failure Avoidable?

Implementors of the first enhancement program faced no impenetrable technological barriers. The modification process was not technically complicated and was successfully completed on 23 aircraft—often ahead of time and under the original cost and weight estimates.[2] It appears that the primary barrier MAC had to overcome to ensure success—to persuade Congress to *support* a plan that was suitable to the airlines—could have been overcome and that the failure of the program might have been avoidable.

There are indications that MAC was making progress in its efforts to eliminate the congressional obstacle, as it eventually received almost $600 million in funding from Congress.[3] However, it took MAC almost two decades to create this level of congressional commitment. This not only resulted in numerous missed opportunities to enhance the more cost-effective new-production aircraft, but it ultimately increased the civil air carriers' perception of the program's risk to the point where interest in conversion was limited to a single carrier that was searching for any path that would help solve its financial difficulties.[4] It is conceivable that MAC could have avoided these problems had it accomplished some, or all, of the following actions.

- MAC should have ensured that the appropriate members and committees of Congress had a better understanding of the CRAF enhancement concept, including a better description of *all* of the expenses involved in modifying the aircraft. In addition to eliminating numerous delays and ensuring that sufficient funds to conduct a conversion were made available, this action could have significantly improved the damaging perception the airlines held concerning the government's level of commitment to the program.
- MAC should have worked closer with DOD and the Air Force to ensure that a unified front was presented to Congress. By eliminating the sometimes opposing actions of these three groups, AMC could have reduced congressional confusion and subsequent delays, resulting in improved support for the program.
- MAC should have anticipated several of the smaller congressional concerns (e.g., issues pertaining to bankruptcy and the sale or lease of modified aircraft) and taken proactive steps to address these issues before they became concerns.

By presenting a unified front to a Congress that was well informed on the key details of the CRAF Enhancement Program and by addressing several issues before they became congressional concerns, MAC might have improved the level of commitment and financial support provided by Congress, while simultaneously reducing the airlines' concerns that rose from its perception that the government lacked commitment. These actions might have sped up the CRAF enhancement process to the point where a significant level of funding became available prior to the point where airline interest was limited to a few financially distressed carriers.

MAC might also have avoided the barrier created by the bankruptcy of Pan American Airlines. By requiring the provision for a lien to be placed on any modified aircraft, MAC could have ensured access to its investment in the event of a carrier's financial failure.

It is difficult to predict, with any certainty, that AMC could overcome these, or similar barriers, if it should attempt to implement a new CRAF Enhancement Program. Although many barriers (e.g., bankruptcy and the sale or lease of modified aircraft) could easily be eliminated through the inclusion of appropriate provisions in any new contracts, the contemporary environment must be examined to determine if any new concerns exist that could ultimately threaten the success of a new CRAF Enhancement Program.

Contemporary Concerns

The diagnosis that the previous CRAF Enhancement Program's failure could have been avoided does not mean that the success of a future program is guaranteed. The world has changed since the original program was implemented, and these changes, while possibly making it easier to overcome

some original barriers, could present additional barriers that may not be surmountable. This chapter describe these changes by examining three primary environments where the changes have occurred: the military, the government, and the airlines. The following section analyzes these changes and describes their potential impact on the CRAF Enhancement Program.

The Military

Since formulation of the original CRAF Enhancement Program, the characteristics of the military environment have changed in several ways. First, although the fall of the Soviet Union has reduced the threat of global war, it apparently has increased the possibility of low-to-medium-sized regional conflicts. The increased likelihood of regional contingencies, combined with large reductions in US forward presence, increases the nation's dependence on strategic airlift to transport troops, equipment, supplies, or humanitarian relief to any corner of the world.

Second, the recent reduction in the strategic airlift goal to 52 MTM/D means that the airlift gap that must be bridged is much smaller today than it was during the 1970s and 1980s. Whereas the gap that existed during the first CRAF Enhancement Program required more than 100 wide-body aircraft to fill, the current gap may require only 15 to 20 aircraft.[5]

Third, reductions in forces stationed overseas may decrease the peacetime requirement for contract airlift augmentation. Estimates indicate that the amount of contract cargo business that AMC could offer to the civil carriers may ultimately decrease to one-quarter of the requirements that existed in the 1980s.[6] This predicted decline has yet to occur—most likely due to problems with the C-141s and higher than expected levels of humanitarian and contingency airlift operation—and planners at AMC estimate that contract airlift business for fiscal year 1995 will total approximately $600 million.[7] However, the character of this airlift business has shifted towards an increasing amount of "expansion airlift" which, due to its uncertainty and volatility, is not as attractive to the civil air carriers.[8] Should future US policy allow a reduction in the current high level of humanitarian and contingency operations, the resulting decrease in expansion airlift would reduce the overall amount of contract airlift dollars AMC has to offer to CRAF participants.

Finally, the military experiences in the Gulf War may indicate a shift in the "type" of cargo that needs to be moved. Because of the long distances involved in getting cargo to the Persian Gulf, a greater-than-planned amount of the military's outsized cargo was moved by sea lift. This resulted in a shift in demand, requiring the airlift system to carry more bulk and oversized cargo and less outsized cargo than was originally planned. This shift increases the attractiveness of bulk- and oversized-cargo-capacity, civil-type transports.[9] Although these conditions may not be present in all conflict situations, current scenarios depicting the most likely location of future contingencies predict deployment distances similar to those of the Gulf War.

The Government

Although the government has made large cuts in the defense budget, it has continued to recognize the importance of strategic airlift mobility. The government has indicated a desire to fill the airlift shortfall and, like the Air Force, had counted on the C-17 to solve the problem. The C-17 buy was reduced, not because Congress was unwilling to support the purchase of additional airlift capability, but because of problems with the aircraft and the manufacturer.[10] Congressional interest in both the C-17 and NDAA demonstrates a continued willingness to improve the nation's strategic cargo airlift capability.

The Airlines

Of the three environments examined, changes to the civil air carrier environment are the most significant. Deregulation, competition, and the Desert Storm experience have acted together to mold the current environment into one that barely resembles that which existed during the original CRAF Enhancement Program.

Deregulation of the nation's airlines began in 1978 and has resulted in several changes to the air carrier system. Increased price competition, due to the effects of deregulation, has required airlines to improve the efficiency of their operations. This action not only reduced the amount of excess capacity that each carrier maintained, it also changed the character of the commercial aircraft fleet.[11] As the airlines moved to the more efficient hub-and-spoke operations that exist today, the need for wide-body aircraft was severely reduced. The result is that US airlines are shifting their domestic operations away from large aircraft—primarily using B-737- and 757-type aircraft—and the few wide-body aircraft that are purchased are being employed on international routes.

Increased competition also affects the air carrier environment. Of the three US carriers that previously provided the bulk of America's international wide-body fleet, Pan Am has gone out of business, TWA has filed Chapter 11 bankruptcy and divested some international business, and Northwest Airlines has entered into an international partnership with KLM Royal Dutch Airlines. This means that the US airline industry no longer dominates much of the international route structure.[12] Consequently, most current orders for wide-body aircraft are being placed by non-US carriers.[13]

An additional effect of increased competition is the movement of the air carriers away from purchasing and towards leasing their aircraft. Leasing is advantageous to the carriers because (1) it increases flexibility by allowing the airline to make rapid modifications to its fleet size and composition based on market analysis; (2) it allows the carriers to keep their fleet supplied with the newest models of aircraft; and (3) decreased airline profits make the tax advantages of leasing more attractive. This trend towards the leasing of aircraft is expected to increase.[14]

The civil aviation environment has also been changed by the Desert Storm experience. The activation of the CRAF during the Gulf War—the first activation in the 40-plus-year history of the CRAF—had some negative effects on the airlines. First, although the CRAF made significant contributions to the airlift effort, the first-ever CRAF activation raised concerns over the frequency and extent that participants would be called upon in the future.[15] This has led some carriers to reconsider the risk of future involvement in the CRAF. Second, the experiences of the Gulf War also raised concerns that aircraft insurance coverage in future contingency situations may be difficult to procure, if it is available at all.[16] This concern could reduce the civil air carriers' willingness to participate in the CRAF.

The changes in the character of the military, government, and airline industry have combined to create a totally new environment in which any shortfall-correcting alternative would have to exist. It is, therefore, essential to explore these changes and determine their impact—positive or negative—on the potential viability of the CRAF Enhancement Program.

Impact of the Contemporary Issues

The environment that existed during the first CRAF Enhancement Program has been altered. This section analyzes the changes described in the previous section and determines their potential impacts.

Impact of the Military Changes

Changes to the military have created both positive and negative impacts on the future of CRAF enhancement. On the positive side, reductions in force structure and forward presence make the ability of the CRAF Enhancement Program to generate relatively inexpensive airlift capacity potentially attractive to both the military and Congress. If the shift of strategic airlift requirements away from carrying so much outsized cargo becomes the norm, the cargo-convertibles—with their great bulk and oversized capability—offer a more cost-effective alternative than any organic military option. Whereas the annual cost to maintain each ton-mile per day of capacity is $9.00 for the CRAF Enhancement Program, a similar organic military capability would be $152.[17]

A final positive impact is created because of the small size of the current airlift shortfall. While MAC previously had to persuade Congress to fund the conversion of a fleet of over 100 aircraft, today's AMC has a much smaller goal and may find Congress more agreeable. Also, the smaller requirement may make it easier for AMC to develop tailored incentive packages, thereby ensuring sufficient airline interest.

Some changes to the military environment, however, have had a negative impact on the CRAF Enhancement Program. While CRAF enhancement offers a fiscally attractive, fairly quick means of correcting the shortfall, it

does not necessarily provide the availability and flexibility that DOD requires. For example, the initial group of enhanced aircraft was not readily available during the Gulf War, since the CRAF Stage III, where they were assigned, was not activated.[18] However, this barrier is surmountable and could be overcome by requiring future CRAF enhanced aircraft to be entered into Stage I or Stage II contracts.

AMC, also, will likely find that reductions in the volume of peacetime DOD contract airlift severely reduce its ability to use contract airlift as an incentive to participate in the CRAF Enhancement Program. This means that AMC will have to convince Congress to support some other form of incentive program (e.g., cash payments, tax breaks). Unfortunately, these types of incentives may uncover the previously buried "airline subsidy" concerns of Congress.

Impact of the Government Changes

The financial problems of the postderegulatory airline industry have created a negative impact on the government concerning the CRAF Enhancement Program. Most prominent was the effect created by Pan Am's bankruptcy. Although progress had been made in recovering some of the funds invested in Pan Am conversions, only seven of the original 19 Pan Am convertibles remain in the CRAF.[19] The Pan Am bankruptcy has left the government leery of any future CRAF Enhancement Program; however, this problem is not insurmountable.[20] By establishing the requirement to place a lien on any aircraft that is modified by government funds, the government's investment would be protected in the event of another financial disaster.

Apart from this concern, the government's recent willingness to fund the reduction of the airlift shortfall makes it conceivable that Congress would fiscally support the CRAF Enhancement Program, assuming AMC does a good job demonstrating its cost-effectiveness.

Impact of the Airline Changes

In the aftermath of deregulation, increased competition, and CRAF activation during the Gulf War, the contemporary airline environment is significantly different from the one that existed during the 1970s and 1980s. Unfortunately, these changes have had an overwhelmingly negative impact on the viability of a future CRAF Enhancement Program.

The effects of deregulation and increased competition will make it difficult for AMC to entice the airlines into contributing wide-body aircraft for conversion. The airlines' move to hub-and-spoke operations and the subsequent divestiture of their large aircraft mean that there are few domestic wide-body aircraft available for participation. And since the few that do exist fill unique niches of the domestic market, it is unlikely that the airlines would be willing to face the costs of losing these scarce assets during a CRAF activation.[21]

Therefore, to implement a future CRAF Enhancement Program, AMC would have to look where the majority of US carrier wide-body aircraft

operate—the international market. Unfortunately, the problem is further complicated by the changes that have also occurred in this market segment. The fact that US carriers no longer dominate the international market means that the US government is limited in its ability to protect the airlines from market-share loss during future activations. In the past, when US carriers dominated the international market and the industry was regulated, the government could ensure that nonparticipating competitors did not benefit at the expense of those contributing to the CRAF. Today, the airlines spend years attempting to make even minor increases in their international market shares. AMC's, and the government's, inability to protect this valuable commodity makes it improbable that the airlines would be willing to contribute their international wide-body aircraft to another CRAF Enhancement Program.[22] The size of the incentive that would be required to ensure participation and reduce the cost-effectiveness of the program would most likely be unacceptable to Congress. Maybe this focus on wide-body aircraft creates an unnecessary constraint. There are a number of medium-sized aircraft in the domestic fleet that, while lacking outsized capability, have substantial bulk and oversized capacity.[23]

Another contemporary trend that is disturbing for the CRAF Enhancement Program is the shift towards international ownership of former US-owned airlines. With Northwest, US Air, and Delta all entering agreements with foreign air carriers, AMC may find itself mired in legal issues concerning activation of these joint-owned assets, not to mention the possibility of conflicts in national interests.[24]

Another negative impact created by changes to the airline environment is the increasing trend for US air carriers to lease their aircraft instead of buying them. This means that, in order to implement a new CRAF Enhancement Program, AMC would have to *both* persuade the leasing company to accomplish the modifications and entice the airline into leasing and participating in the CRAF with the modified aircraft. In attempting to overcome this "double incentive" barrier, AMC would find that it is hindered by the fact that the long-term contractual agreement needed to make the program cost-effective is counterproductive to the benefits of leasing an aircraft. A major reason that airlines turn to leasing is for the increased flexibility it provides in managing the size and composition of their fleets. The required CRAF commitment that is essential to the enhancement program threatens to reduce this flexibility and could reduce the willingness of both the lessee and the lessor to participate.[25]

A final major negative impact caused by the contemporary airline changes is that concerns over the frequency of further CRAF activations have reduced some airlines' interest in participating in the CRAF. Shortly after the Desert Storm activation, several carriers withdrew their aircraft from the CRAF Program. Although some carriers have renewed their CRAF membership, there remains much concern throughout the industry over the business risks incumbent in future activations.[26]

If implemented, any new CRAF Enhancement Program would face a significantly different environment than did its predecessor. While changes to the airline environment are overwhelmingly negative, the following and final section of this study analyzes the combined implications of these changes and provides recommendations concerning the viability of any future use of the CRAF Enhancement Program.

Implications and Recommendations

In comparison to the previous program, the contemporary environment does not appear favorable to the implementation of a new CRAF Enhancement Program. Although some new conditions—such as a more manageable shortfall, the shift towards an increasing percentage of bulk and oversized airlift requirements, and increased congressional support for a solution—would tend to facilitate a new attempt, current conditions, otherwise, generally act as barriers to the success of another CRAF Enhancement Program.

Implications

During the first enhancement program, MAC was able to motivate the airlines with a cost-effective incentive program, but failed to achieve its goal due to its inability to convince Congress to support the plan. Ironically, today's environment is almost completely opposite. Whereas AMC stands a good chance of gaining congressional support for a cost-effective incentive plan, drastic changes to the airline environment will likely increase the actual incentive the airlines will expect for participation, particularly in relation to the original enhancement program. Unfortunately, the value of the incentives that would be required to overcome the airlines' contemporary fears of CRAF activation, and subsequent loss of market share, would be so high that the economies of the program would be degraded to the point where Congress, and maybe even AMC, would decide to withdraw their support.

This problem, combined with current moves toward increased levels of aircraft leasing and international agreements, threatens to create a barrier that even the unified efforts of AMC, the Air Force, and DOD would be unable to overcome. For those reasons, the future viability of reviving the CRAF Enhancement Program, while not hopeless, is relatively bleak.

There does exist, however, certain conditions under which the implementation of either a traditional CRAF Enhancement Program or a modified enhancement program would have some utility. The viability of these options is directly related to the results of the previously mentioned fall 1995 Defense Acquisition Board (DAB).

If the predictions of some planners at AMC are correct and the fall DAB significantly increases the size of the C-17 buy, the implementation of a small-scale version of the original enhancement program may still be feasible.

Whereas the C-17s could handle the outsized and military-unique mission requirements, a CRAF enhanced cargo-convertible would be suitable for filling the shortfall of bulk and oversized cargo. Additionally, since the shortfall requirement would be relatively small, it might be conceivable that a sufficient number of *domestic* wide-body aircraft could be found and their parent carriers convinced into participating in a small-scale program. Since only a small number of aircraft would be required, AMC could possibly fill part of the shortfall with aircraft from the US domestic fleet, thereby avoiding the incentive problems that accompany the use of the international wide-body fleet. It is questionable, however, that sufficient nonleased domestic aircraft exist to permit successful execution of this option.

A particularly attractive variant of the small-scale CRAF enhancement plan would be for AMC to secure commitment to the CRAF of the 12 previously enhanced aircraft that no longer remain in the CRAF Program. The reinstatement of these aircraft would not only be extremely quick and cost-effective, it would also generate sufficient cargo airlift potential to compensate for the estimated annual increases in the airlift shortfall until the year 1999.[27] Additional measures (e.g., organic military airlift, NDAA, or additional CRAF modifications) would be necessary to close the gap completely.

On the other hand, if the fall 1995 DAB fails to increase the C-17 buy, the size of the airlift shortfall—much larger than the one described in chapter 2—would reduce the viability and feasibility of implementing another CRAF Enhancement Program. This would require AMC to entice the airlines to contribute their leased and international market wide-body aircraft which, as previously demonstrated, is an unlikely proposition. Therefore, in this situation, a traditional implementation of the CRAF enhancement concept is not the best option.

AMC could, however, explore the possibility of modifying the CRAF Enhancement Program to improve its viability. This proposed modification envisions AMC purchasing cargo-convertible aircraft and leasing them, at subsidized rates, to interested carriers. This option permits AMC to bypass the barriers associated with a civil lessor or lessee arrangement and possibly entice participation in either the domestic or international market. The Military Air Transport Service employed this so-called bailment program in the 1950s, and it was reconsidered during the original enhancement program but was rejected due to legal and unfair competition concerns.[28] Although the legal issues concerning the lease arrangements would still have to be addressed, the plan should evoke less "unfair competition" complaints than would AMC's NDAA program, which proposes to move CRAF-compatible cargo on military-owned and -operated commercial-type aircraft.

Depending on the specifics of the situation, one or more of these options could prove to be a viable method of reducing the nation's strategic airlift shortfall. It is important to note, however, none of these alternatives relieves AMC of the requirement to overcome the CRAF activation concerns of the airlines in order to ensure participation.

Recommendations

Enhancement of the CRAF is not the best alternative in all situations. However, in cases where a CRAF enhancement option appears viable, attention to the following recommendations may improve the program's chances for success.

- **Prevent the reoccurrence of the old CRAF enhancement problems.** In order to do this, AMC would need to take several actions. First, AMC needs to ensure that Congress, DOD, and the Air Force completely understand the proposed program in order to avoid unnecessary delays in support and funding. Second, AMC must make an effort to ensure that the proposed program is supported by the Air Force and DOD in order to prevent Congress from sensing a lack of unified commitment. Finally, AMC must understand, explain, and work within the limitations of the program (e.g., it cannot fulfill outsize or unique military requirements).
- **Settle the legal concerns up front.** AMC must protect and ensure access to the aircraft it enhances in the event they are sold or leased or the carrier encounters financial difficulty. These issues should be addressed in a binding contract between the carrier and AMC. Additionally, the availability of the aircraft must be ensured by requiring that all enhanced aircraft are enrolled in the CRAF Stage I or Stage II as a minimum.
- **Regain the use of the previously enhanced aircraft.** By taking action now, AMC can quickly increase its cargo airlift capacity by more than 1.9 MTM/D. This increase will be helpful no matter what shortfall-reducing alternative is finally selected.[29]
- **Consider the small-scale enhancement option.** AMC should take steps to examine the viability of the small-scale enhancement option. This option may prove to be both feasible and cost-effective should the fall 1995 DAB authorize increases in the C-17 buy.
- **Consider a modified enhancement option.** AMC should also study the possibility of implementing a modified version of the original CRAF Enhancement Program in order to fill the airlift shortfall. A variant, such as bailment, may permit AMC to avoid some of the otherwise insurmountable barriers that exist in the contemporary environment.
- **Create improved incentives.** The government has recently added some of its non-DOD airlift requirements into the peacetime award contract system in order to improve the program's incentive potential.[30] The search must continue for additional ways to provide incentives to the airlines to ensure participation. For example, the government could attempt to enter into international agreements that provide some degree of market-share protection to US international carriers in the event of a CRAF activation.
- **Reduce activation concerns.** AMC must take action to relieve the airlines' concerns over future CRAF activations. One possibility would be to provide an activation surcharge that compensated carriers at a rate

well above the normal peacetime rate in the event of activation. This option would not only improve AMC's ability to calm the activation fears of the airlines, but it would also help to reduce Congress's worries over the appearance of providing peacetime subsidies to the airlines.[31]

- **Study the viability of using medium-sized aircraft.** In order to avoid the obstacles involved in enticing the use of internationally operated wide-body aircraft, AMC should investigate the possibility of modifying some of the more domestically prevalent medium-sized aircraft (e.g., Boeing's 757, 767, or 777 models). Since the US government's ability to protect carriers is greater in the domestic market, use of these medium-sized domestic aircraft might reduce the air carriers' activation concerns. AMC must examine the capabilities of these smaller aircraft, as well as the costs and feasibility of conversion, to determine if they could suitably fill the shortfall requirements.[32]
- **Don't put all the eggs in one basket.** Any future enhancement program should not allow a single carrier or leasing agent to possess a large portion of the program's assets. This action will help prevent the reoccurrence of the financial and bureaucratic nightmares that accompanied Pan Am's collapse.
- **Continue to examine the environment for changes.** AMC must continue to monitor the military, government, and airline environment for changes that could either increase or decrease the viability and feasibility of an existing or future enhancement program.

Conclusion

During the 1970s and 1980s, MAC spent almost two decades attempting to fill its airlift shortfall by implementing the CRAF Enhancement Program. The program failed, however, because of MAC's inability to persuade Congress to support an incentive plan that was both cost-effective and attractive enough to motivate the airlines into participation.

Today's AMC also faces an airlift shortfall and, although it is not so large as in the past, it threatens to increase during the next several years. AMC has considered several alternatives in its efforts to fill the airlift gap; however, it appears to have overlooked the possible benefits of resurrecting the CRAF Enhancement Program.

This study has determined that contemporary conditions do not favor the implementation of a large-scale traditional CRAF Enhancement Program. Although it is conceivable that AMC could gain congressional support for a relatively cost-effective incentive plan, airline concerns over business risk and CRAF activation, as well as changes to the composition of the airlines' fleets, make it improbable that any cost-effective incentive plan could elicit sufficient airline participation. Therefore, large-scale implementation of any plan similar to the original enhancement program should not be attempted unless

the barriers pertaining to airline incentives and CRAF activation concerns can be overcome.

The CRAF enhancement concept, however, is not without utility. AMC could benefit by implementing a small-scale or modified CRAF enhancement plan that was adapted to the current situation. Variations from the original enhancement plan would allow AMC to avoid some barriers that would otherwise be insurmountable. Additionally, AMC should take immediate action to regain the cargo airlift potential that was lost after Pan Am's bankruptcy.

Enhancement of the Civil Reserve Air Fleet is not the answer to all of AMC's airlift shortfall concerns; however, it is an alternative that deserves study. A properly tailored CRAF Enhancement Program, implemented under the correct conditions, has the potential to help ensure the National Airlift System is prepared to accomplish its mission.

Notes

1. *Military Airlift: Changes Underway to Ensure Continued Success of Civil Reserve Air Fleet*, GAO/NSIAD-93-12 (Washington, D.C.: General Accounting Office, December 1992), 19.
2. MAC History, 1 January–31 December 1983, vol. 1, 479. See also MAC History, 1 January–31 December 1985, vol. 1, 435.
3. *Civil Reserve Air Fleet*, Audit Report no. 92-068, Department of Defense, Office of the Inspector General, 3 April 1992, 13.
4. Maj Jill A. Hamilton, former CRAF enhancement contracting officer, Headquarters AMC, telephone interview with author, 16 May 1995.
5. The number depends on how many C-17s are approved for acquisition in the fall 1995 DAB—see the NDAA section in chap. 2 of this study.
6. Jean R. Gebman, Lois J. Batchelder, and Katherine M. Poehlmann, *Finding the Right Mix of Military and Civil Airlift: Issues and Implications*, RAND MR-406/AF, 3 vols. (Santa Monica, Calif.: RAND, 1994), 2:59.
7. Maj Juan R. Sotomayer, CRAF program manager, Headquarters AMC, Civil Air Office, telephone interview with author, 9 June 1995.
8. Maj James A. Blackwell, assistant chief, Headquarters AMC, Contracting and Air Law Division, telephone interview with author, 9 June 1995.
9. Gebman, 1:17–20.
10. Ibid., 3:112, 113.
11. Tim Neale, director of Public Relations, Air Transport Association, telephone interview with author, 5 June 1995.
12. Kristina Erickson, Washington, D.C. representative, Boeing Defense and Space Group, telephone interview with author, 2 June 1995. See also Gebman, 2:55, 56.
13. Gebman, 1:23.
14. Neale, telephone interview.
15. Gebman, 1:22.
16. Lt Col Nelson R. Wilt, deputy assistant for Civil Air Office, Headquarters AMC, interview with author, 12 May 1995. See also Gebman, 2:51.
17. Gebman, 2:44.
18. *Civil Reserve Air Fleet*, 15.
19. Of the original 19 Pan Am convertibles, one was destroyed by a terrorist bomb, four are for sale/lease and are in storage, 13 are operating in their cargo configurations, and one is undergoing conversion to freighter configuration. Ron Van Horn, Civil Air Office, Headquarters

AMC, memorandum to Headquarters AMC/DO, subject: Status of the 19 Former Pan Am CRAF Enhanced B-747 Aircraft, 12 October 1994.

20. Hamilton, telephone interview.

21. Erickson, telephone interview. Also Neale, telephone interview.

22. Ibid.

23. Kristina Erickson, telephone interview with author, 12 June 1995.

24. Gebman, 2:57.

25. Neale, telephone interview.

26. Gebman, 2:54, 55.

27. The 12 aircraft would generate approximately 1.94 MTM/D cargo airlift capacity, whereas the total short-term increase in airlift shortfall has been estimated at 2.14 MTM/D. Figures compiled from MAC History, 1 January–31 December 1988, vol. 1, 375; and Capt Timothy S. Smith, strategic airlift plans officer, Headquarters AMC, Long Range Plans, worksheet, subject: Strategic Capability, 12 April 1995.

28. MAC History, 1 January–31 December 1983, vol. 1, 479.

29. It does appear that AMC is making some effort to get these aircraft back into the CRAF. There are, however, CRAF eligibility problems with the carrier that owns these assets that are creating delays. Blackwell, telephone interview.

30. Sotomayer, telephone interview.

31. Gebman, 2:66, 67.

32. For example, The Boeing Company offers three potential candidates: the B-757, 767, and 777. While the B-757 is the only one of the three that is FAA certified for freighter operations, it has no outsize or oversize capability. The B-767—currently undergoing freighter certification—cannot carry any outsized cargo, but it does have bulk and limited oversized capacity. It also has a significant payload potential—131,700 pounds—and extended range. There are no current plans for a cargo version of the B-777. Erickson, telephone interview, 12 June 1995.

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